STATUS REPORT ON THE REVIEW OF THE PROPOSED CRANDON MINE: September 2002

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On September 17, 2002, BHP Billiton, announced that it will close the Nicolet Minerals Company offices in Crandon and work to sell the mine project. The company has indicated, however, that it will not withdraw the permit applications; the company's consultants and attorneys will be acting on its behalf. Therefore, review and verification work for the permits and the draft environmental impact statement will continue.

See our Crandon Project Web site at: http://www.dnr.state.wi.us/org/es/science/crandon/ for an overview of our review process as well as maps and other related information.

The Department's review of the proposed mine - The Crandon project team and its consultants have completed a number of work items in the ongoing review of the Nicolet Mineral Company (NMC) proposals. The team is close to finishing its review and verification work on the proposed Crandon project. The company has provided almost all the needed data. However, there are still some important tasks that remain to be finished before the team can complete the permit and environmental reviews of the proposed Crandon mine. The following is a review of the work performed in development of the draft environmental impact statement (DEIS) since June of 2001.

Groundwater flow modeling and mine inflow estimates at the proposed project site – The Department and consultants completed work on a version of the regional groundwater flow model for the proposed mining site. The groundwater flow model is a computer-assisted representation of the groundwater in the bedrock and glacial sediments and its interactions with surface waters of project area lakes and streams. The model is used to simulate the proposed mine and help in evaluating how mine development would affect groundwater and surface water levels.

In late 2001, the Department incorporated the company's revised grouting plan and the locations of the mine access openings into our version of the regional flow model. This allowed updated estimates of mine inflow under the project as proposed and better predictions of the impacts expected from the groundwater drawdown. The simulations resulted in estimated mine inflows ranging from "Low End" (285 gpm) to "High End" (1,250 gpm). Under a local agreement with the town of Lincoln, NMC must ensure that groundwater pumping from the mine does not exceed 600 gallons per minute (gpm) over a rolling 30-day average. In September of 2001, the Department supported the concept of a 600 gpm mine pumping rate being incorporated into the project proposal contingent upon appropriate monitoring and enforcement provisions. Based on the professional judgment of the Department and its consultants, it is believed that the "High End" ungrouted inflow (estimated to be 1,760 gpm) could be reduced by at least 75% with the potential to exceed 90%, if properly designed, conducted and monitored. In this case, it appears that NMC could be reasonably expected to be able to reduce inflow below the 600 gpm limit.

The final flow model predictions of the project's effects on groundwater and surface waters will be summarized in the DEIS. A technical regional flow model report, containing a detailed description of the model and modeling results, will be released at approximately the same time as the DEIS.

Final revised comments on the company's surface water mitigation plan – In accordance with the agreement between NMC and the Town of Lincoln, the Department has agreed to the concept of a 600 gpm limitation on the operation of the proposed Crandon mine. Completion of the flow modeling work and the 600 gpm limitation have allowed the Department to more clearly focus on those water bodies that would be impacted, define the extent of the impact and recommend alternatives that would prevent the "unreasonable detriment" (as required by the mining law) to lakes and streams from the mining project. The Department has established lake levels and stream flows for most of the water bodies in the project area that must be maintained to prevent their unreasonable detriment. These elevations and discharges are called Metallic Mining Minimum Stages and Metallic Mining Minimum Flows. If the

groundwater drawdown caused by mine pumping would affect a lake or stream by reducing its level or flow below the minimum established threshold, the company would have to add water to that water body. The water would have to be similar in quality to the lake or stream water and be sufficient in quantity to prevent the unreasonable detriment to the lake or stream.

In September of 2001, the Department submitted its revised final comments and recommendations on the proposed Crandon Surface Water Mitigation Plan. At this time, the Department does not intend to provide any additional comprehensive comments on the plan and will provide its impact analysis in the draft and final environmental impact statements.

Review of tailings management area and reclaim pond chemistry - Department staff and consultants continue to evaluate the chemistry of the wastes proposed for disposal in the tailings management area (TMA) and the water to be stored in the reclaim pond.

The TMA would be a surface waste disposal facility similar in design to a modern, engineered landfill. The bulk of the wastes would be depyritized tailings, but waste rock and other small amounts of wastes would be disposed of there as well. The company has proposed to keep the TMA wastes from potentially becoming acidic, and would add limestone if necessary to make sure that there could not be production of excess acid. It is also necessary to determine the composition of the leachate in order to determine how it might react with components of the facility, such as the liner and the drainage layer, and the subsurface beneath the facility.

In June of 2001, the Department provided preliminary comments on the company's TMA Groundwater Quality Performance Evaluation. The comments indicated that the company's estimates of the expected concentrations of solute in the TMA and Reclaim Pond water might not be reasonable. As a result, NMC revised the source term and submitted the revised information in a document titled Addendum #1 to the Ground Water Quality Performance Evaluation in early September.

In early October of 2001, the Department provided initial comments on NMC's Addendum #1 to the Ground Water Quality Performance Evaluation. The Department requested additional information and clarification primarily on issues relating to reclaim pond design, thiosalts in the process and reclaim pond water, and waste chemistry in the TMA. In late October NMC responded to the comments in the letter.

The Department and its consultants continue to work on evaluating and characterizing the waste. When the analyses are complete, this information will be used as an input to the TMA Solute Transport Model in an effort to predict what groundwater impacts may be expected from the TMA. The evaluation of the TMA/Reclaim Pond Source Term will be released in a technical document in support of the DEIS.

Analysis of tailings management area impacts on groundwater quality – NMC utilized the HELP Model to evaluate leachate generation rates during TMA operation and post-closure periods, and percolation rates through the cap and liner. The rates were used to estimate the volume of leachate that may be expected to exfiltrate from the TMA. The HELP model is a water balance model that was developed for the U.S. Environmental Protection Agency by the U.S. Army Corps of Engineers. The Department has used the HELP Model and other techniques to evaluate the expected performance of the TMA and reclaim pond.

At issue last year was the volume of water (from rain, snow melt, etc.) predicted to infiltrate through the TMA cap after closure. Over the long term, TMA cap performance is the key design feature that controls compliance with groundwater quality standards. In July of 2001, the Department and its consultants expressed concerns with the performance of the proposed TMA cap. At issue was the rate at which water would infiltrate through the cap. This is important because water that percolates through the cap is assumed to eventually pass through the tailings and out the bottom once leachate collection is stopped. After many years of draining, it is assumed that equilibrium would exist in the TMA. Equilibrium would exist when the rate of percolation from the liner equals the rate at which water percolates down from the cap. The Department had concerns that this situation could potentially increase the transport of contaminants from the TMA.

In response to the Department's concerns, NMC submitted its Verification/Contingency Plan for Long Term Performance of the Tailing Management Area Cap in November of 2001. The purpose of the plan was to identify and propose actions NMC could follow to verify that the TMA cap would perform as designed. The plan also identifies a contingency plan for enhancing cap performance to meet performance standards necessary to comply with groundwater quality standards over the long term.

In June of 2002, the Department's consultants provided an evaluation of the "pinch out" zone representation submitted by NMC in the TMA Solute Transport Model. The pinch out zone is an area where the underlying geologic representation did not correspond to the Department's current understanding of the geology. In the area of the TMA, it is a band of soils with lower hydraulic conductivity located adjacent to Hemlock Creek. The model runs performed by the Department's consultants indicate that the Department's own interpretation of the pinch out zone, which is confined to a narrower region than that presented by NMC, does not significantly change the maximum concentration of contaminants predicted to reach the Design Management Zone (DMZ) boundary. The Design Management Zone, 1,200 feet from the edge of the wastes, is the 3-dimensional boundary around the TMA where groundwater quality enforcement standards must always be met. The addition of a hypothetical channel with higher hydraulic conductivity than the surrounding pinch out zone soil leads to similar maximum concentrations arriving at the western DMZ and lowers the maximum concentrations at the eastern DMZ.

The results of the TMA/Reclaim Pond solute transport model will be presented as relative concentrations of a generic solute, with special attention to concentrations at the DMZ compliance boundary. The Department and its consultants have nearly completed work on the TMA/Reclaim Pond solute transport model. Final runs of the model will be conducted using information obtained from the assessment of TMA exfiltration.

When the Department and its consultants complete work on the estimates of TMA/Reclaim pond source term, predictions on potential groundwater impacts can be made. The groundwater regulations require that the TMA and reclaim pond comply with groundwater quality standards at all times. The Department's evaluation of the potential impacts to groundwater will be presented in the draft environmental impact statement. The TMA/Reclaim Pond Solute Transport Model Report will be released as a supporting document to the DEIS.

TMA surface water distribution - In reviewing the TMA Surface Runoff Analysis for the draft environmental impact statement, an apparent discrepancy was identified in the information presented in the company's Environmental Impact Report. It was observed that NMC did not properly account for a portion of the precipitation expected to fall on the TMA. The Department has asked NMC to revisit that work and provide the corrected information.

Review re-flooded mine water chemistry - During active mining, the underground openings, or stopes, from which ore would be removed would be backfilled with the pyrite-rich tailings segregated in the mill. Cement would be added to the backfilled tailings for underground structural stability as well as to maximize mineral removal. Following mine re-flooding, the long term impacts to groundwater quality depend partly on the chemistry of the backfilled pyritic tailings, the degree of oxidation and acid production, and on groundwater movement in and around the mine workings. Groundwater quality around the mine also could be affected by accumulated oxidation products on the mine walls and from pollutants left in the mine.

In July of 2001, the Department's consultants completed the preliminary review relating to the geochemistry-related portion of the Re-flooded Mine Management Plan (RMMP). The comments applied to Appendix A of the RMMP, the Re-flooded Mine Source Concentrations Report. The Department requested additional information, additional sensitivity analyses and clarification on some of the material in the report. The Department received the requested sensitivity analyses from NMC in June of 2002. The Department and its consultants are currently in the process of reviewing and verifying the information. A Re-flooded Mine Source Term Report that characterizes the expected solute concentrations in the proposed mine will be released by the Department's consultants near the time the DEIS is released.

Review re-flooded mine impacts to groundwater quality - The Department is evaluating the potential for the re-flooded mine to affect groundwater quality in the bedrock and glacial system around the mine. Some pollutants would remain in the underground mine from mining operations due to placement of the backfill and oxidation during the period of mine pumping. The groundwater rules require the abandoned mine to meet groundwater standards at the DMZ at all times.

In August of 2001, the Department provided preliminary comments on the solute transport-related portions of the Re-flooded Mine Management Plan, located in Appendix B. In those comments, it was requested that additional sensitivity analyses be performed on aspects of the grouting plan. In addition, input and clarification from NMC on differences observed when comparing NMC's model to the Department's was requested. NMC's groundwater model utilizes the software program MODFLOWT, while the department utilizes MT3DMS. The Department will be using its version of the model to help evaluate the reflooded mine compliance with groundwater standards. When comparing the two, it was observed that there were differences between the results generated, even though an identical suite of parameters were used as input into the respective models. The reason for the difference in the maximum concentrations at the DMZ was unclear and could be attributed to differences in the models used for evaluation. In September, NMC submitted the requested sensitivity analyses and indicated that they would continue to investigate the discrepancies observed between the MOTFLOWT and MT3DMS models.

In an effort to answer some of the outstanding questions, the Department and its consultants undertook simulations with the Re-flooded Mine Model. The simulations incorporated the High-End and Low-End bedrock hydraulic conductivity distribution from the DNR's version of the regional groundwater flow model into the model submitted by NMC. The results seemed to suggest that when the conductivity distributions for the Department's model was used, rather than the ones submitted with the NMC model, some redistribution of mass from the deep to the shallow portions of the system occurs. In addition, the time required for potential contaminants to reach an approximate maximum at the DMZ in most of the model layers is substantially shortened. In the Department's August 12, 2002 letter, concern was expressed about the potential for contamination in the shallow (available) groundwater from the re-flooded mine, given the nature of the hydrologic system in the project area and plan presented in the RMMP. Currently there are also questions as to the potential longevity of the grout proposed to limit mine inflow. There is the possibility that the grout could remain stable and functional for a substantial time following mine closure, which may affect the viability of the open flow closure approach presented in the RMMP.

NMC responded soon after, in a letter dated August 27, 2002, indicating that the issues the Department had identified in the letter are consistent with the types of issues that NMC envisioned the RMMP would need to accommodate. NMC believes that the engineering controls identified in RMMP and the framework for implementation can address the changes in the understanding of the site conditions. In such a case as outlined in the Department's letter, NMC has proposed to reduce the degree of vertical connection between the mine workings in an effort to limit the upward flux of solute from deeper regions of the mine. NMC indicates that it will have the needed engineering options available to both protect the environment and comply with applicable regulations. The Department and NMC will continue to work at evaluating and resolving these issues as they appear in the review and verification process.

When work on the RMMP solute transport model and the estimates of the source term are completed, the Department will be able to predict what types of impacts to groundwater from the re-flooded mine may be expected. The final conclusions will be presented in the DEIS and in an associated technical document on the re-flooded mine transport review.

Analysis of air quality modeling data and technical memorandum preparation - During construction and operation of the proposed mine, underground drilling, blasting, waste rock and ore handling and crushing activities would result in generation of airborne particulates, some of which would be released into the atmosphere from the vertical shafts at the mine. Ore and waste rock handling at the surface facilities would also result in additional particulate releases. The particulates would be dispersed and settle onto the mining project area and surrounding lands.

In the fall of 2001 the Department completed the majority of its air quality modeling for the proposed Crandon mine. Due to project revisions, additional air quality modeling was performed in winter and spring of 2002. Computer modeling is a major tool used by the DNR to facilitate permit review and environmental impact assessment. The modeling requires information from a variety of sources including the permit applicant, EPA guidance, scientific literature relevant to the model being used and professional experience. The model used for the Air Program analysis is the standard EPA Industrial Source Complex model (ISC3). The ISC3 model is commonly used by regulatory agencies when evaluating industrial sources. It was used for the Department's air dispersion modeling, to evaluate compliance with air quality standards, for analysis of potential dusting impacts and air deposition impact analysis. The results from this modeling will be used by the Department to determine project-related impacts to terrestrial ecosystems, surface waters, aquatic biota and human health. The effects of the emissions will be evaluated and presented in the Department's draft and final environmental impact statements.

Many groups involved with the proposed Crandon mine project have expressed interest in obtaining this information. As a result, the Department plans on releasing the air deposition modeling data as a Technical Memorandum in the fall of 2002.

Review the company's plan for its irrevocable trust - NMC is continuing to work on its plan to meet the rule requirement, but it will not be submitted until after the DEIS is released, as this information is not considered a part of the environmental impact statement process.

Continue preliminary review of mining moratorium candidate mine sites - In May of 2002, the Department identified a concern with the Sacaton Mine (Casa Grande, Arizona), one of the sites that NMC submitted for compliance with the "mining moratorium law." In accordance with the statutes, the department is required to make a finding that the site did not result in significant environmental pollution, and this finding is to be based on the results of relevant monitoring data. Due to an apparent lack of available data on the site, the Department made a preliminary conclusion that the Sacaton Mine did not meet the statutory standard because "there is simply not enough information from which to draw any conclusion regarding the mining site's performance in the period following closure." NMC does not agree with the conclusions in the Department's letter. In their July 2002 correspondence, NMC has requested the opportunity to augment the data submitted with the original December 1998 Compliance Demonstration document. They have instructed their consultants to investigate whether additional relevant data gathered since December 1998 might prove useful in the Department's evaluation of the Sacaton site. The Department would consider revisiting its preliminary conclusion on the Sacaton site in light of any additional information, as indicated in its May 31, 2002 letter.

The Department continues to review the other two candidate mines submitted by the Nicolet Minerals Company. The Department plans to summarize its findings and release an interim report at the time of the release of the DEIS. Final decisions on whether the individual mines meet the moratorium law criteria will be made at the Master Hearing by an Administrative Law Judge.

Continue work needed to complete the draft environmental impact statement –The Department has made significant progress on the draft environmental impact statement. However, the following key items still need to be completed prior to release of the DEIS:

- Complete final review of tailings management area waste chemistry;
- Complete analysis of tailings management area impacts to groundwater quality;
- Re-evaluate re-flooded mine water chemistry;
- Re-evaluate re-flooded mine impacts to groundwater quality;

Project schedule - Because the Department must first complete all of the technical environmental reviews, and several are ongoing, the exact schedule for releasing the DEIS on the proposed mine is uncertain, but is unlikely to be released before April of 2003. If the Department does identify significant additional information needs or discover other potential problems during the review work, release of the DEIS could be delayed.

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